Poster #1617

Age-specific Distribution of Antimicrobial Use Surveillance using National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB Japan) 2011-2013

Daisuke Yamasaki[1)], Masaki Tanabe[1)], Yuichi Muraki[2)], Genta Kato[3)] and Tetsuya Yagi[4)]

1) Department of Infection Control and Prevention, Mie University Hospital, Mie, Japan, 2) Department of Clinical Pharmacoepidemiology, Kyoto Pharmaceutical University, Kyoto, Japan,

3) Solutions Center for Health Insurance Claims, Kyoto University Hospital, Kyoto, Japan and 4) Department of Infectious Diseases, Nagoya University Hospital, Aichi, Japan

Daisuke Yamasaki, Ph.D
Mie University Hospital
2-174 Edobashi, Tsu,
Mie 514-8507, Japan
TEL +81-59-231-5436
yamadai@clin.medic.mie-u.ac.jp

BACKGROUND

Antimicrobial use (AMU) surveillance is one of the key actions in the Japanese national plan on antimicrobial resistance (AMR). National database of health insurance claims and specific health checkups of Japan (NDB), which archives e-claim big data, is one candidate for their data source, since universal healthcare system is established in Japan and e-claim data covers almost all citizens. However, no study has been performed using NDB for assessing AMU.

Our objectives were to analyze the quantities and patterns of total systemic antibiotic prescriptions using NDB and to evaluate its usefulness.

METHODS

The quantities and patterns of total systemic antimicrobial prescription were analyzed using claim data in the NDB collected through the Ministry of Health, Labour and Welfare of Japan.

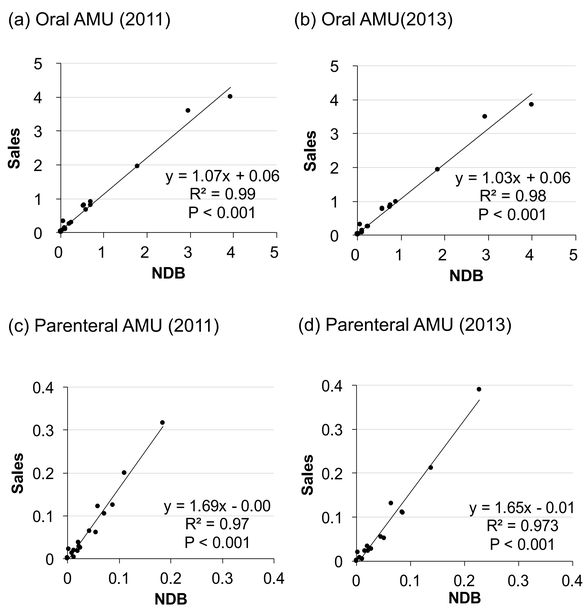
The population-weighted total AMU expressed as defined daily doses (DDDs) per 1,000 inhabitants per day (DID) were measured by the NDB. These DID values of each antimicrobial were integrated using the taxonomy of the ATC classification.

- First, these DID values by the NDB in 2011 and 2013 were directly compared with those calculated by sales data [1)].
- Then, trend analysis of DID from 2011 to 2013 and subgroup analysis stratified by antimicrobial category (ATC classification) and age group were performed.

RESULTS

There was a significant linear correlation between the AMUs measured by the sales data and the NDB (Figure 1). However, the gradient of parenteral AMU showed a higher value (1.65-1.69) than that of oral AMU (1.03-1.07). This suggests that a tendency of the NDB to underestimate AMU compared to sales data, especially for parenteral antimicrobials.

Figure 1:Oral and Parenteral AMU comparison calculated by the NDB and the sales data in 2011 and 2013.



*Scatter plots represent DIDs at the ATC 4th level calculated by the NDB and sales data with linear regression

Total oral and parenteral AMUs stratified by age class (in 5 year increments) are shown in Figure 2. Oral AMU stratified by age-class demonstrated a U-shaped curve, with higher DIDs in the younger and older age classes. In contrast, parenteral AMU stratified by age-class showed an upward-sloping curve.

Figure 2:Trend of total Oral and Parenteral antimicrobial use stratified by age-class.

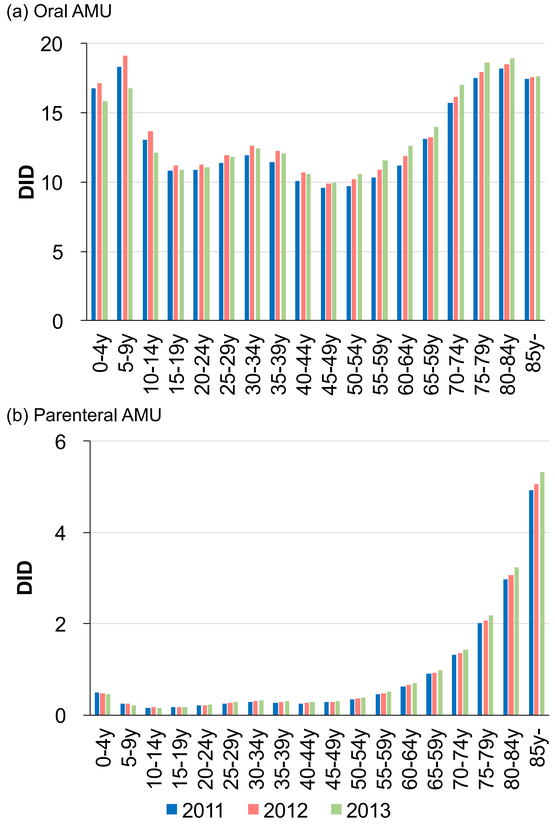


Table 1 :AMU stratified by ATC classification and age group in 2013.

(a) Oral AMU

ATC 4th level	age group					
	0-14 y		15-64 y		65 y-	
	DID in 2013	Δ	DID in 2013	Δ	DID in 2013	Δ
Teracycline (J01AA)	0.257 (1.7)	-0.045	0.666 (5.9)	0.059	0.476 (2.8)	0.061
Amphenicols (J01BA)	0.000 (0.0)	0.000	0.000 (0.0)	0.000	0.000 (0.0)	0.000
Penicillins with extended spectrum (J01CA)	0.878 (5.9)	-0.049	0.683 (6.0)	0.192	0.872 (5.2)	0.376
β-Lactamase-sensitive penicillins (J01CE)	0.087 (0.6)	-0.012	0.013 (0.1)	-0.001	0.009 (0.1)	-0.002
Combinations of penicillins, including β-lactamase inhibitor (J01CR)	0.905 (6.1)	0.098	0.117 (1.0)	0.017	0.162 (1.0)	0.039
First-generation cephalosporin (J01DB)	0.142 (1.0)	-0.021	0.084 (0.7)	-0.008	0.136 (0.8)	-0.010
Second-generation cephalosporins (J01DC)	0.011 (0.1)	0.000	0.063 (0.6)	-0.006	0.062 (0.4)	-0.007
Third-generation cephalosporins (J01DD)	5.643 (38.1)	-0.336	2.456 (21.6)	0.047	2.709 (16.1)	-0.060
Penems (J01DI)	0.203 (1.4)	0.019	0.089 (0.8)	0.005	0.084 (0.5)	-0.002
Combinations of sulfonamides and trimethoprim, including derivatives (J01EE)	0.251 (1.7)	0.012	0.565 (5.0)	0.101	2.010 (11.9)	0.386
Short-acting macrolide (J01FA)	0.322 (2.2)	-0.066	0.091 (0.8)	-0.004	0.592 (3.5)	-0.019
Intermediate-acting macrolide (J01FA)	4.662 (31.4)	-0.549	3.220 (28.3)	0.084	5.571 (33.0)	0.142
Long-acting macrolide (J01FA)	0.637 (4.3)	-0.390	0.619 (5.4)	-0.094	0.443 (2.6)	-0.057
Lincosamides (J 01FF)	0.003 (0.0)	0.000	0.011 (0.1)	0.001	0.012 (0.1)	0.002
First-generation Fluoroquinolones (J01MA)	0.029 (0.2)	-0.005	0.026 (0.2)	0.000	0.045 (0.3)	-0.006
Second-generation Fluoroquinolones (J01MA)	0.561 (3.8)	0.208	1.732 (15.2)	0.052	2.75 (16.3)	-0.095
Third-generation Fluoroquinolones (J1MA)	0.029 (0.2)	-0.001	0.848 (7.5)	0.170	0.836 (5.0)	0.134
Polymyxins (J01XB)	0.007 (0.0)	0.000	0.003 (0.0)	0.000	0.008 (0.0)	-0.001
Other antibacterials (J01XX)	0.205 (1.4)	-0.011	0.083 (0.7)	0.007	0.087 (0.5)	-0.001
Total	14.800	-1.147	11.368	0.625	16.866	0.879

(b) Parenteral AMU

ATC 4th level	age group					
	0-14 y		15-64 y		65 y-	
	DID in 2013	Δ	DID in 2013	Δ	DID in 2013	Δ
Teracycline (J01AA)	0.003 (1.2)	-0.004	0.004 (1.1)	-0.001	0.031 (1.4)	-0.003
Amphenicols (J01BA)	0.000 (0.0)	0.000	0.000 (0.0)	0.000	0.000 (0.0)	0.000
Penicillins with extended spectrum (J01CA)	0.034 (12.5)	0.002	0.015 (4.3)	0.002	0.057 (2.5)	0.005
β-Lactamase-sensitive penicillins (J01CE)	0.000 (0.0)	0.000	0.001 (0.4)	0.000	0.005 (0.2)	0.001
Combinations of penicillins, including β-lactamase inhibitor (J01CR)	0.047 (17.3)	-0.004	0.058 (16.0)	0.010	0.738 (32.4)	0.103
First-generation cephalosporins (J01DB)	0.014 (5.2)	0.001	0.040 (11.2)	0.004	0.154 (6.8)	0.009
Second-generation cephalosporins (J01DC)	0.024 (8.7)	-0.007	0.054 (15.1)	-0.002	0.190 (8.4)	-0.016
Third-generation cephalosporins (J01DD)	0.055 (20.3)	-0.001	0.063 (17.4)	0.011	0.367 (16.1)	0.067
Fourth-generation cephalosporins (JO1DE)	0.007 (2.4)	0.001	0.021 (5.7)	0.001	0.127 (5.6)	0.004
Monobactams (J01DF)	0.000 (0.0)	0.000	0.000 (0.0)	0.000	0.001 (0.1)	0.000
Carbapenenems (J01DH)	0.014 (5.1)	0.000	0.032 (9.0)	0.006	0.255 (11.2)	0.025
Short-acting macrolide (J01FA)	0.001 (0.2)	0.000	0.000 (0.0)	0.000	0.001 (0.1)	-0.001
Long-acting macrolide (J01FA)	0.000 (0.1)	0.000	0.001 (0.3)	0.001	0.008 (0.3)	0.008
Lincosamides (J01FF)	0.010 (3.8)	-0.006	0.014 (3.8)	0.001	0.050 (2.2)	-0.004
Streptogramins (J01FG)	0.000 (0.0)	0.000	0.000 (0.0)	0.000	0.000 (0.0)	0.000
Aminoglycosides (J01GB)	0.052 (19.3)	-0.004	0.029 (8.1)	-0.003	0.102 (4.5)	-0.017
Second-generation Fluoroquinolones (J01MA)	0.000 (0.1)	0.000	0.008 (2.2)	0.001	0.078 (3.4)	0.010
Third-generation Fluoroquinolones (J1MA)	0.000 (0.0)	0.000	0.002 (0.4)	-0.001	0.020 (0.9)	-0.007
Glycopeptides (J01XA)	0.006 (2.1)	0.001	0.009 (2.5)	0.000	0.056 (2.5)	-0.007
Other antibacterials (J01XX)	0.004 (1.6)	0.000	0.009 (2.4)	0.001	0.036 (1.6)	0.006
Total	0.271	-0.019	0.360	0.032	2.276	0.180

* DID in 2013 Data show defined daily doses per 1000 inhabitants per days (% among age group). Delta (Δ) values show the difference between 2013 and 2011 value.

When stratified by age group (0-14, 15-64, 65 and above years old), total oral AMU in the children group (0-14 years old) was comparable to that of the elderly group (65 and above years old) (Table 1). Third-generation oral cephalosporins were the most frequently used oral antimicrobials in the children group, whereas macrolides were the most frequently used oral antimicrobials in the other age groups. Parenteral AMU in the elderly group was extremely high compared to the other age groups. Combinations of penicillins including β-lactamase inhibitors and cephalosporins were frequently used regardless of age group.

CONCLUSIONS

This is the first report showing the usefulness of AMU surveillance using NDB. This study demonstrated that third-generation oral cephalosphorins in the children group and macrolides in the elderly group would be important targets for combating AMR.

ACKNOWLEGEMENT

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